

POTENTIAL DEVELOPMENT PLAN FOR PROJECT LANDS FOR
WILDLIFE HABITAT IMPROVEMENT

A. PURPOSE AND STATUS

This appendix presents a tentative proposal for wildlife habitat development to be undertaken by the Corps of Engineers on the existing Federally-owned Lower Snake River project lands. This appendix has been adapted from a report which is still subject to approval by various Corps of Engineers officials, and the proposal is subject to funding procedures. With one exception, the plan is considered to be within the existing management authority of the Corps of Engineers without additional special Congressional authorization. In this respect, it is different from most of the other mitigation proposals.

An inventory of all existing project lands was conducted to determine those areas most suitable for wildlife habitat improvement measures. The following text, and the maps found after page G-85, describe the areas and the wildlife management program.

B. DESIGNATION OF HABITAT AREAS

Wildlife habitats which were selected for intensive development were assigned numbers starting at Ice Harbor Dam and proceeding upstream to the upper end of Lower Granite Reservoir. The numbers on Lower Monumental Reservoir start with 11, those on

Little Goose Reservoir (Lake Bryan) start with 21, and those on Lower Granite Reservoir start with 31. Numbers referring to the habitats on the south bank are followed by the letter S; those on the north bank are followed by the letter N.

All wildlife habitats are identified by the above numbering system on Maps 2 through 5. Approximate boundaries are indicated on these maps by straight lines drawn at the upper and lower extremity of each habitat. As previously mentioned, the maps are found following page G-85.

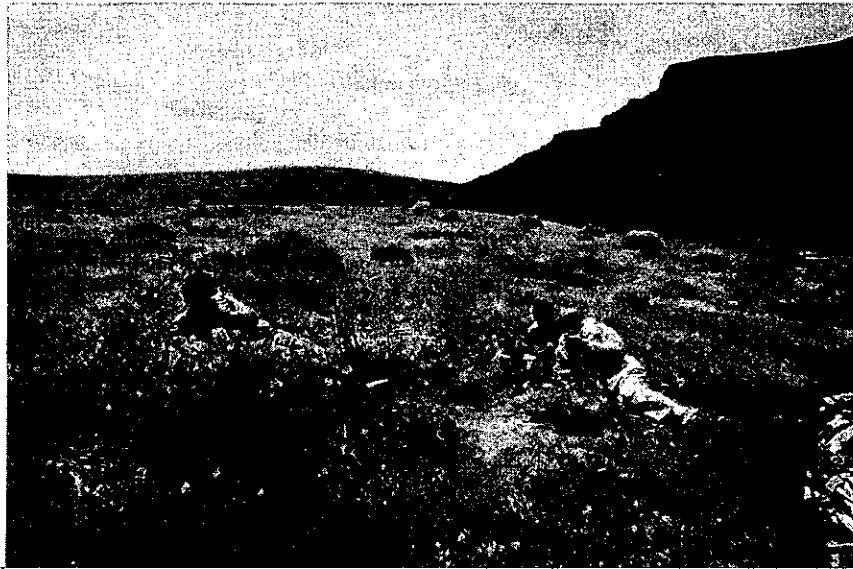
C. OPTIONS FOR WILDLIFE DEVELOPMENT

Numerous options or techniques have been considered for wildlife habitat development. Four of these techniques have been ultimately selected for their economic and biologic feasibility in improving the 22 wildlife habitats designated on the Lower Snake River projects. The techniques include restricting land use by fencing of project lands^{1/}; planting, irrigating, and harvesting of food patches and wildlife cover zones in the intensively managed habitat areas; installing artificial nesting structures for geese; stocking game farm pheasants and/or developing a vegetation nursery.

^{1/} In placement of fencing, corridors will be left to allow for livestock watering access. Livestock watering reservations which now exist will, for the most part, be retained and fenced. In some places the watering corridor reservations may be adjusted (relocated) to better fit the wildlife plan and to fit with livestock watering patterns. Both of these concepts (fencing of existing reservations, and fencing of relocated corridors) are illustrated on the maps. In actual implementation, the detailed arrangements for fencing of corridors for livestock will be coordinated with the adjacent ranchers. Both location and width needed will be reviewed.

Aspects of the four selected options are discussed on the following pages, with the specific development proposals for each habitat site outlined in a later part of this report.

From a wildlife viewpoint, the option for control of grazing in the canyon on lands outside of the project boundary is desirable; however this concept is not being pursued.



Present vegetation on New York Island provides excellent goose nesting habitat; nesting geese are hidden by herbaceous plants yet they can detect approaching danger by lifting their heads above the plants. Photo taken 6 June 1974.

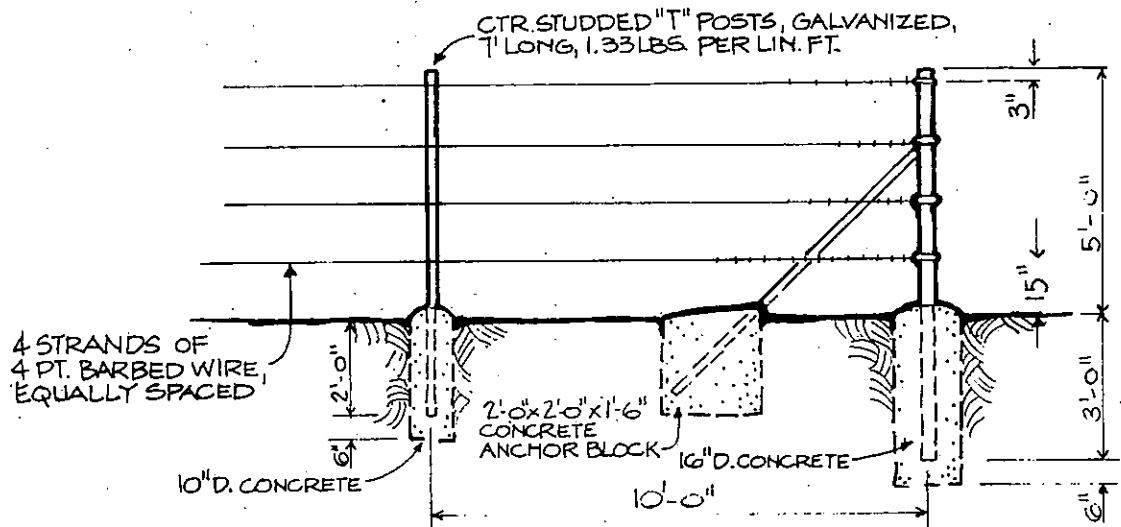
Restricting Land Use. On several wildlife areas, and particularly along the south side of Lower Granite project, native vegetation now supports good wildlife populations. In these several areas there is no need to make habitat plantings. Natural habitat improvement will occur if cutting, burning, grazing, and other land use is restricted

on these lands. Fencing is proposed in these several areas, which may be inside or outside of the designated habitat areas, in order to restrict grazing or other unwanted use.

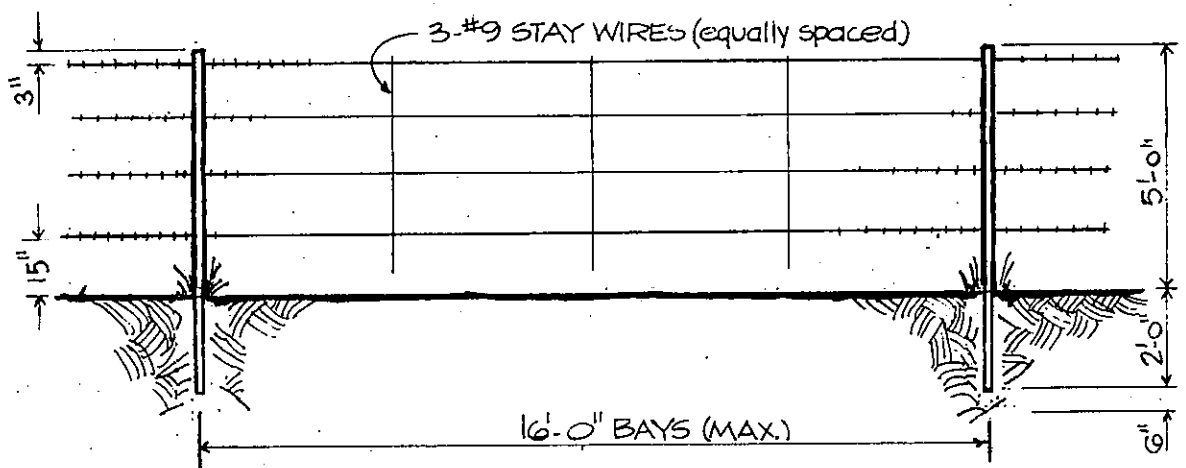
In addition it is desirable to renegotiate the present cattle watering rights on Wildlife Habitats 5-N, 8-S, 9-N, 11-N, 14-N, 21-S, 22-N, 24-S, 25-N, 26-S, and 27-N to allow a fenced corridor of about 25 to 50 feet in width, and reduce grazing and habitat destruction on these areas. Fencing is an essential need for habitat areas not already fenced by railroad right-of-way in order to exclude cattle, however, the corridors would allow the cattle watering to also continue in some areas.

A sketch of the kind of fencing to be used is shown on the next page. The posts would not be set in concrete in firm soil areas, but concrete may be needed in some locations.

Planting, Irrigation, and Managing Habitats. This option provides the greatest values to wildlife of all the options by increasing the carrying capacity of the land. Among the major objectives of the food and cover planting program which follows are (a) to provide the maximum amount of food and cover for animal species found on project lands with



Corner Panel



Intermediate Panel

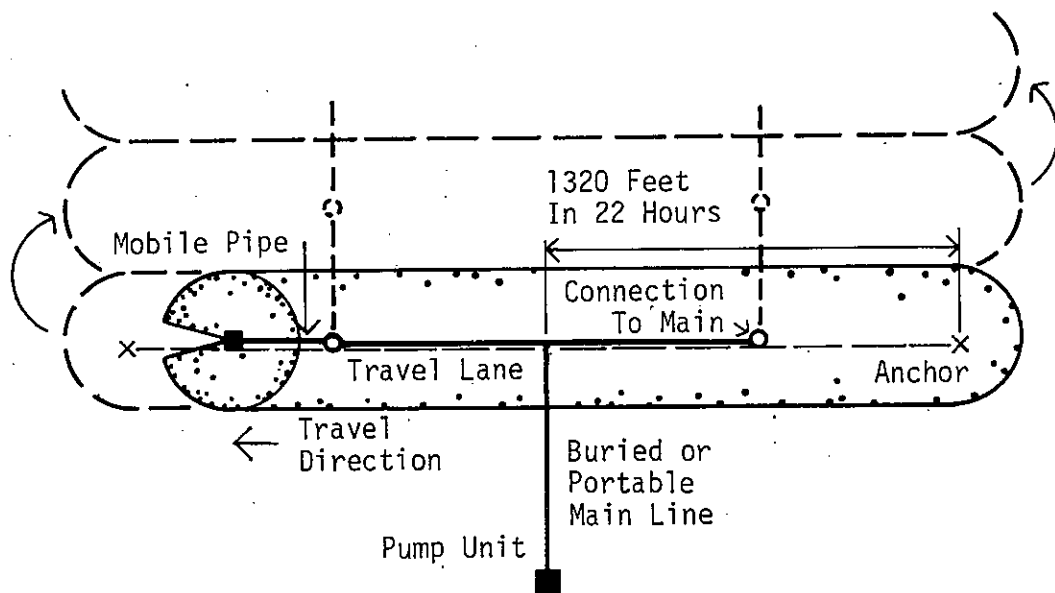
FOUR STRAND BARBED WIRE FENCE

emphasis on upland game animals; (b) to provide this food and cover planting within optimum initial and future economic limits; and (c) to allow for a minimum of both initial and long range operation and maintenance cost.

Five schemes for planting food and cover plants, for irrigating newly planted crops and cover plants, and for managing crops are recommended for improving wildlife habitats on project lands of the Lower Snake River Project. The schemes are illustrated on the following pages and are designated as to their use at the various habitats on Plates 2 thru 5. Irrigation will be accomplished with one of two sprinkler system types with one exception at Snake River Junction (Wildlife Habitat 7N). This site was chosen as a location to test the use of a windmill to maintain a continuous stream of water in an existing intermittent stream. The objective would be to determine how this type of water source would affect upland game bird populations. Other locations which provide similar characteristics of terrain and existing vegetation may be equally suited for such a test and may be considered in lieu of this site for other reasons such as proximity to other test sites.

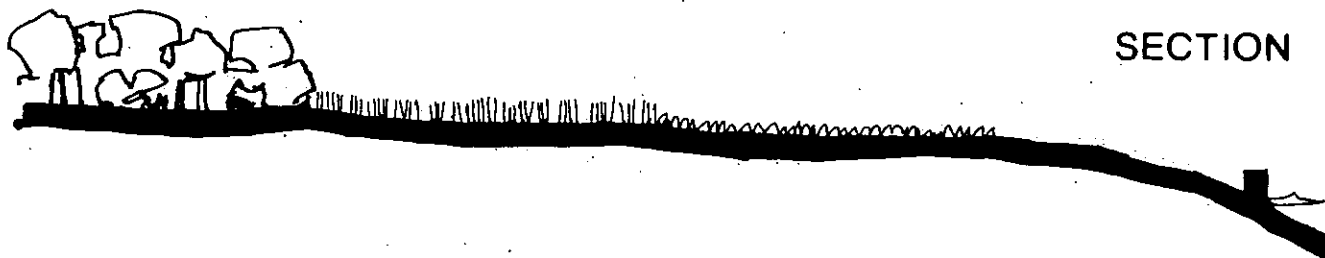
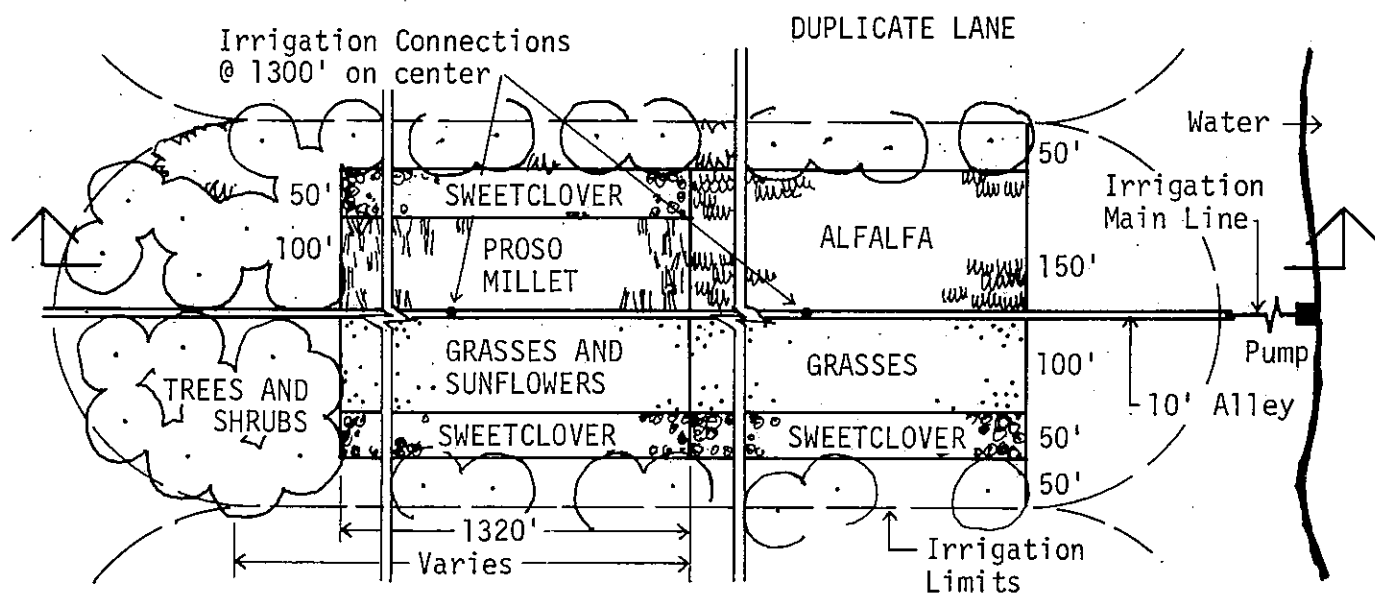
A traveling sprinkler with a coverage radius of 200 feet is the heart of one system of irrigation. It is proposed for use in schemes one, two and three. As can be seen on Plates 2 thru 5, these schemes are designated for use in conjunction with other schemes at

wildlife habitats 1S, 3N, 5N, 6S, 11N, 12S, 15N, 24S, 25N, 26S, and 27N. The sprinkler utilizes a solid set aluminum or plastic main-line which may vary in size from 4 to 6 inches in diameter depending on site conditions such as elevation and distance. Hose connections are spaced at 1300 foot intervals which is determined by the flexible water supply hose which is 660 feet long. It is possible to use a 1320 foot hose with connections set at 2500 foot intervals, however, in most cases this is not necessary, and for reasons of standardization, the 660 foot hose is proposed.



TYPICAL LAYOUT FOR A TRAVELING SPRINKLER SYSTEM

MANAGEMENT SCHEME 1



PLANT LIST

TREES

Black Locust
Mulberry*
Willow
Sumac*
Russian Olive
Black Cottonwood*

SHRUBS

Nanking Cherry
Bladder Senna*
Blueleaf Honeysuckle
Multiflora Rose
Chokecherry
Snowberry
Serviceberry
Red-Osier Dogwood*
Black Hawthorn
River Alder
Caragana

FORBS

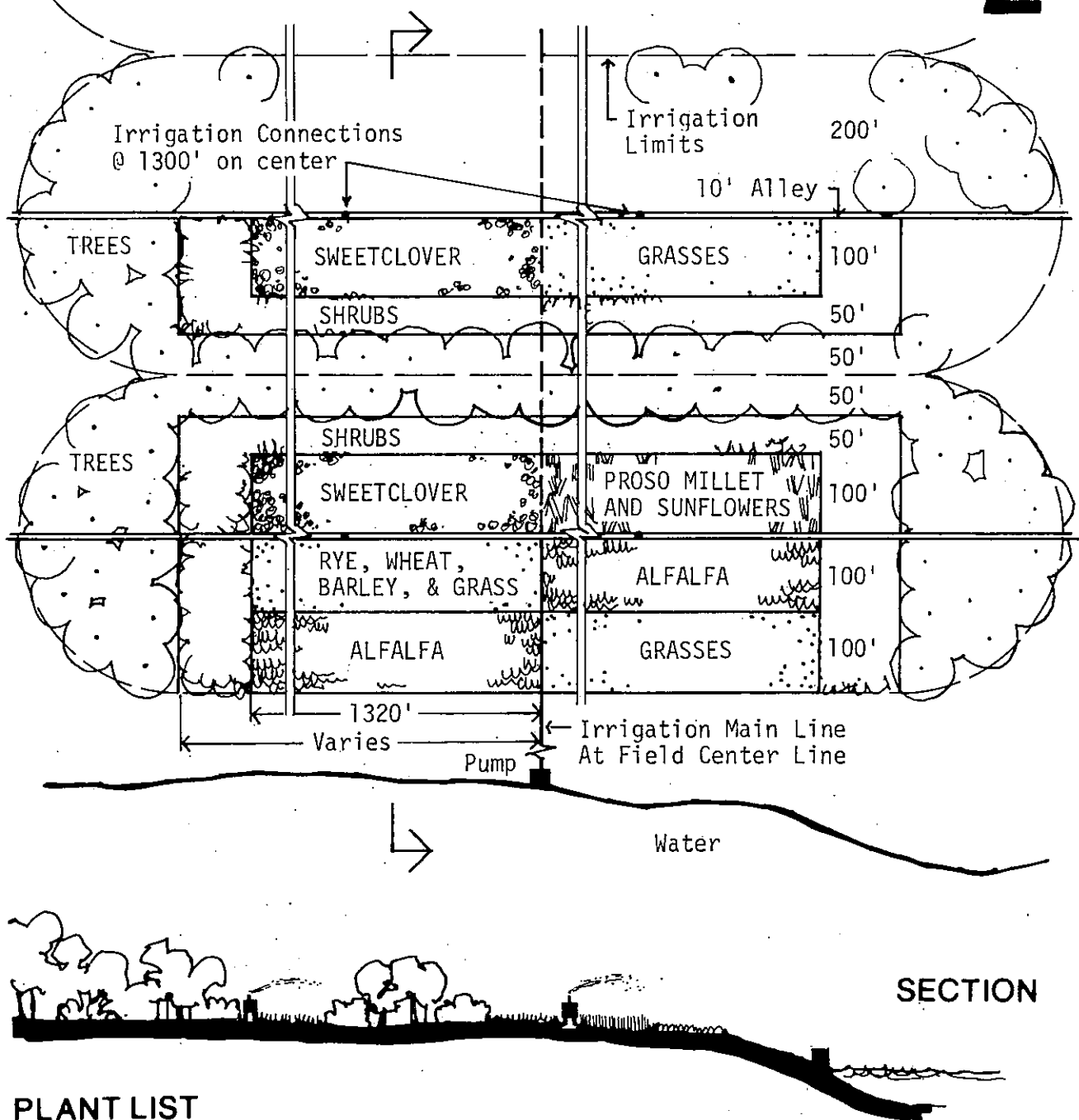
Buckwheat
Sunflowers
Sweetclovers
Alfalfa

GRASSES

Marfed Spring Wheat
Orchard Grasses
Meadow Barley
Idaho Fescue
Elymus
Proso Millet
Intermediate wheatgrass

*Best Results Above Little Goose Dam

MANAGEMENT SCHEME 2



PLANT LIST

TREES

Black Locust
Mulberry*
Willow
Sumac*
Russian Olive
Black Cottonwood*

SHRUBS

Nanking Cherry
Bladder Senna*
Blueleaf Honeysuckle
Multiflora Rose
Chokecherry
Snowberry
Serviceberry
Red-Osier Dogwood*
Black Hawthorn
River Alder
Caragana

FORBS

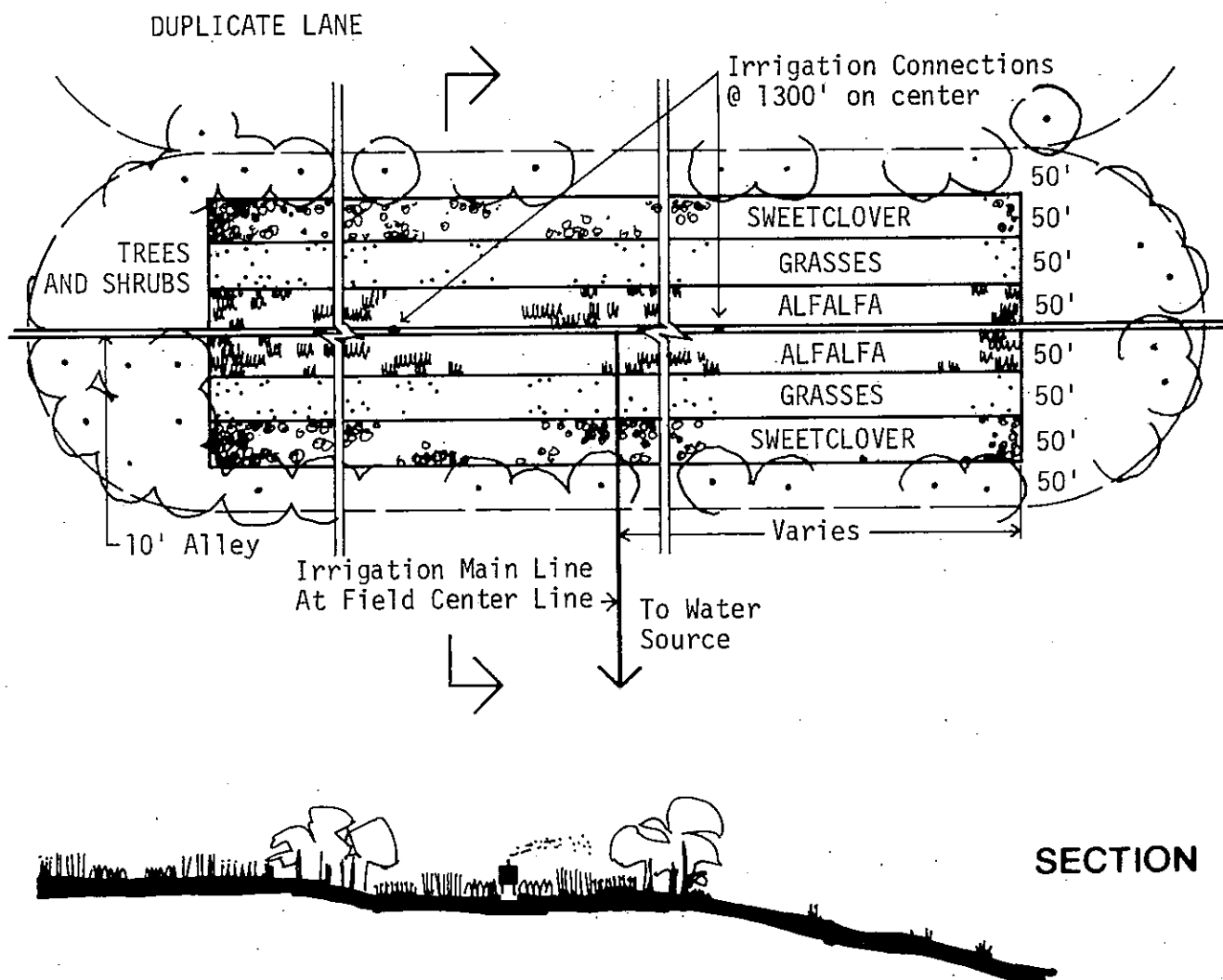
Buckwheat
Sunflowers
Sweetclovers
Alfalfa

GRASSES

Marfed Spring Wheat
Orchard Grasses
Meadow Barley
Idaho Fescue
Elymus
Proso Millet
Intermediate wheatgrass:

*Best Results Above
Little Goose Dam

MANAGEMENT SCHEME 3



PLANT LIST

TREES

Black Locust
Mulberry*
Willow
Sumac*
Russian Olive
Black Cottonwood*

SHRUBS

Nanking Cherry
Bladder Senna*
Blueleaf Honeysuckle
Multiflora Rose
Chokecherry
Snowberry
Serviceberry
Red-Osier Dogwood*
Black Hawthorn
River Alder
Caragana

FORBS

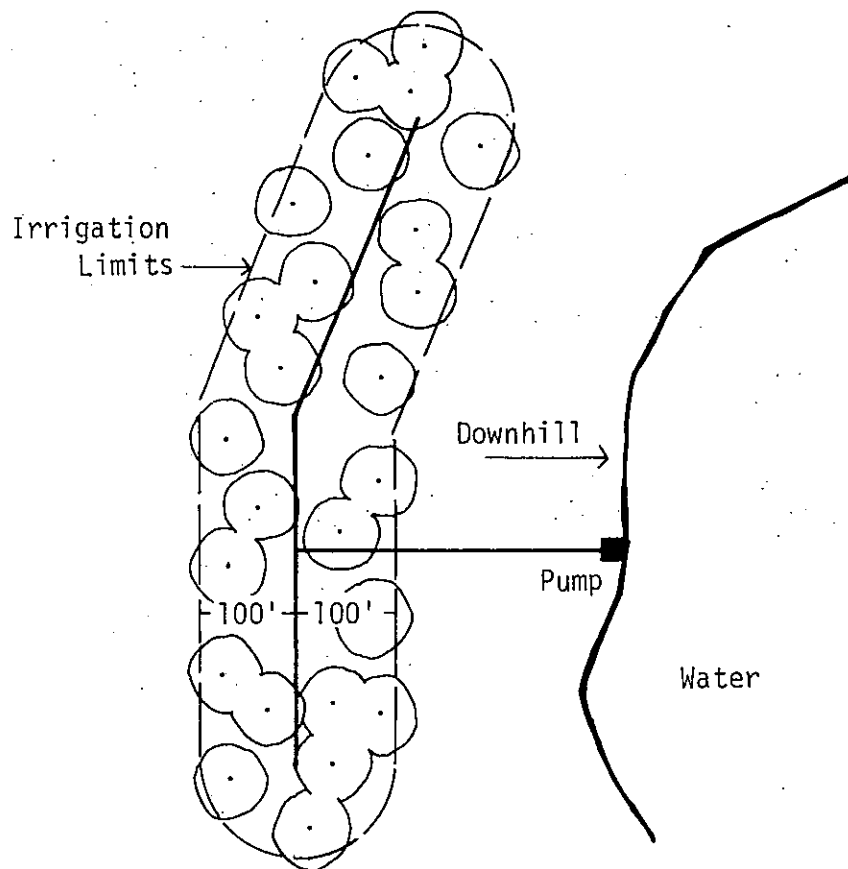
Buckwheat
Sunflowers
Sweetclovers
Alfalfa

GRASSES

Marfed Spring Wheat
Orchard Grasses
Meadow Barley
Idaho Fescue
Elymus

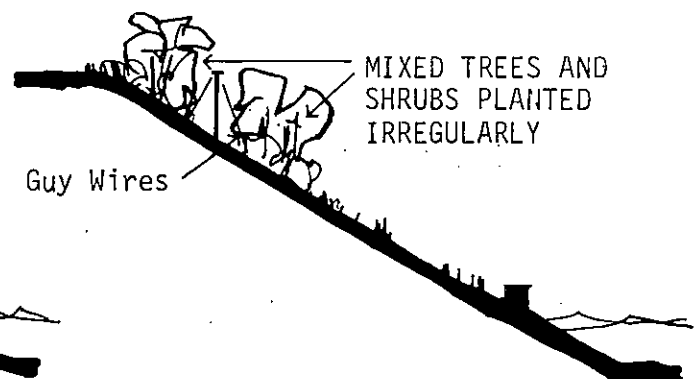
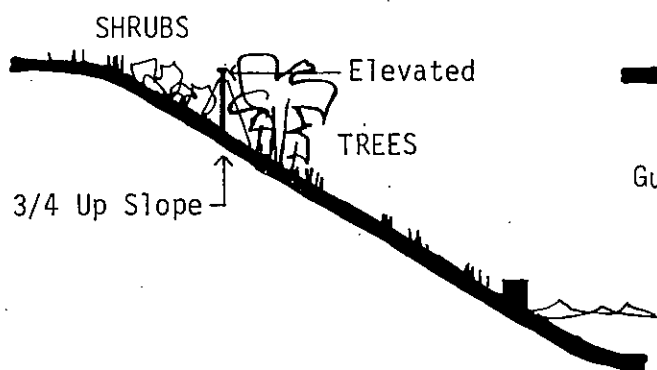
*Best Results Above Little Goose Dam

MANAGEMENT SCHEME 4 and 4a



SECTION 4

SECTION 4a



PLANT LIST

TREES

Black Locust
Mulberry*
Willow
Sumac*
Russian Olive
Black Cottonwood*

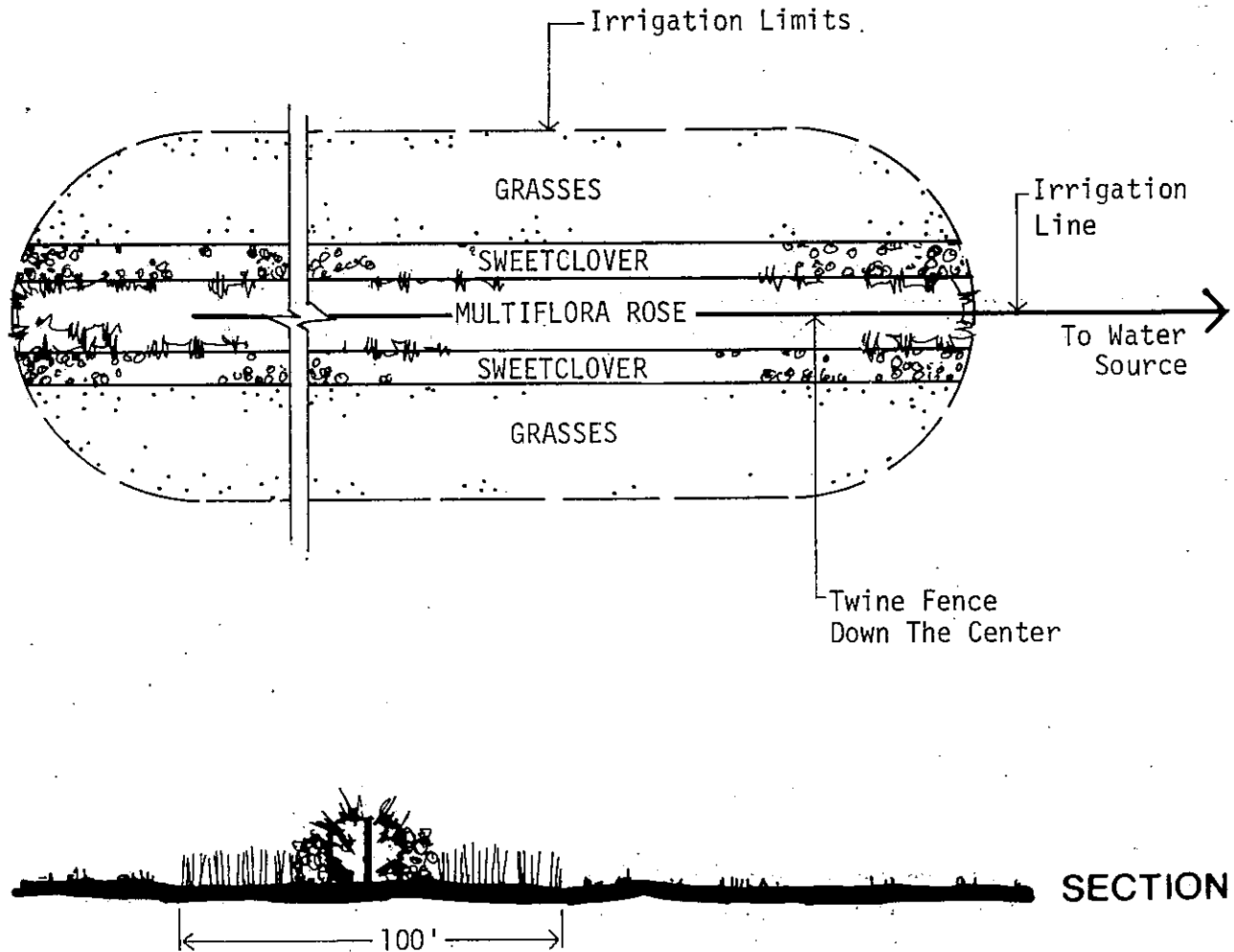
SHRUBS

Nanking Cherry
Bladder Senna*
Blueleaf Honeysuckle
Multiflora Rose
Chokecherry
Snowberry
Red-Osier Dogwood*

Black Hawthorn
River Alder
Caragana

*Best Results Above Little Goose Dam

MANAGEMENT SCHEME 5



PLANT LIST

SHRUBS

Multiflora Rose

FORBS

Sweetclovers

VINES

Clematis
American Vetch

GRASSES

Orchard Grass
Idaho Fescue

Specific features of the self-propelled, mechanized, traveling sprinkler system which warrant mentioning are:

a) Water-piston traveler drive - operating on water supply pressure, the speed compensator drive assures uniformly constant speed at any of numerous travel speed settings. This drive system has few moving parts and is simple to maintain.

b) Low Cost - The system is completely mechanized so that once it is in position and attached to pre-set cable anchors and water is supplied to it, no hand labor is involved. Features such as automatic shut-off at cable anchor points and an automatic shut-off at the pump with a loss in water pressure makes unattended operation possible. This system is one of the least expensive mechanized systems available.

c) Hose and accessory equipment - A specially designed swivel riser and rear-mounted cable drum assures straight line tracking. When straight line paths are not possible, a contour cable release feature establishes automatic turning points. A horizontal hose reel trailer with air pump is used to purge water from the hose and to mechanically reel the hose for convenient movement. This increases the hose life and reduces hand labor.

With 100 psi of water pressure at the nozzle, the traveling system will maintain the necessary moisture content in most soils on a maximum of 130 acres with a 12-day maximum rotation period. None of the management areas will require such a lengthy rotation period, however, due to their size.

The other irrigation system which is used in schemes 4 and 5 utilizes 4-inch diameter aluminum pipe (hand-carry type) which is solid set and elevated nozzles. The diameter of coverage varies from 100-feet to 200-feet. This system will be used at wildlife habitats 1S, 2N, 3N, 4S, 5N, 6S, 7N, 8S, 9N, 11N, 13S, 21S, 22N, and 24S.

Both irrigation systems will be powered by electric lines wherever possible. Local power, which is considered to be close at hand within a few thousand feet or so from the proposed water pump site, is available at wildlife habitats 1S, 2N, 4S, 6S, 7N, 8S, 12S, 15N, 21S, 22N, 24S, and 26S. Distant power, indicated at wildlife habitat 13S, means that electric power is available at a greater distance than local power and will therefore be more costly to make available to the wildlife habitat site.

Portable power is indicated for use at areas 3N, 5N, 9N, 11N, 25N, and 27N. In general this means that a 6-cylinder diesel engine and high head pump to provide about 600 gallons of water per minute at about 150 psi will be required. The portable power unit can be either wheel mounted, base mounted, or it can be semi-permanently installed in a small building. This type of pump unit will satisfy water requirements for irrigation designs with 450 feet of total dynamic head.

It is important to mention that with each of the two irrigation systems, the amount of water to apply and the frequency of application will vary with local soil and weather conditions and types of crops being irrigated. For example, scheme 3 at habitat 27N will probably not require as much water per acre as scheme 3 at habitat

15 because of the difference in natural precipitation rates and differences in subirrigation. Under midsummer conditions of bright sunshine and high air temperatures, a dense stand of growing alfalfa may remove one-third inch or more of water from moist soil in a day.

Food patches, within scheme configurations, are to be rotated every three to five years and will be 1320 feet long to correspond to the maximum travel length of the sprinkler system. Food patch planting will be accomplished at three-year intervals using high quality inoculated seed planted as early in the spring as possible. All food patches will be allowed to grow voluntarily, however, alfalfa may be mown after the first of July to provide young shoots for winter browse.

Seedling plants will be used in all planting schemes. The reason for this is one of economics. A total of about 1094 acres are to be planted. The difference of cost between seedlings at about 15 cents each installed and larger stock of say three-years old or larger at several dollars each installed is considerable. Several 3 to 4-foot trees should be used, however, as planting area markers and as indicators of beaver or rodent damage. When beavers are noted in an area by means of inspecting these plants, a live trapping program should be initiated to remove the animal until the wildlife habitat is established. Rodents can be controlled by use of repellents.

Seedling trees are to be planted at about 8 to 10-feet on center. Seedling shrubs should be planted at 3 to 4-feet on center. Grasses are to be planted at a rate of 12 pounds to the acre and alfalfa at

20 pounds per acre. The cost estimates for planting the various schemes has been based on this type of planting. Local sources of planting stock will be used to the extent possible.

The sketches of the various planting schemes illustrate a rather regular type of planting, and the discussions later in this report refer to various rectangular field sizes. This has been done for ease of reference and to establish the scope of the work involved. It is not the intent that the wildlife habitat planting be done to give a "farm-type" appearance; rather during the implementation phase the planting will be tailored to fit the natural characteristics of each individual site. Grouping of trees and shrubs will be randomly spaced with forb and grass plantings to provide the most naturalistic appearance possible. Maximum use will be made of good soil areas, and local terrain configurations, including local drainage ways.

One factor which will influence the arrangement of the habitat areas will be the need for a set irrigation pattern; however, within the irrigated areas there will be many options for varied arrangement of plantings. District biologists and landscape architects will direct field location and layout of planting to accomplish the naturalistic arrangements.

In many places where habitat planting is done, it is expected that indigenous vegetation will remain and/or become established. This will be particularly true in those areas where tilling is not done and in those areas under long-term irrigation with the absence of future tillage. Increased growth of indigenous species could be

either positive or negative depending on the composition of the plant community. This aspect would have to be considered in the annual maintenance program.

Installing Artificial Goose Nesting Structures. Canada geese probably nested on islands and cliffs in the Snake River Canyon for many centuries. Since there probably never were trees in the canyon of the Lower Snake River Project large enough to support goose nests, ground nesting became firmly established as a behavior pattern.

Under these conditions of traditional ground nesting, a floating type of structure would seem most appropriate and acceptable by geese for nesting.

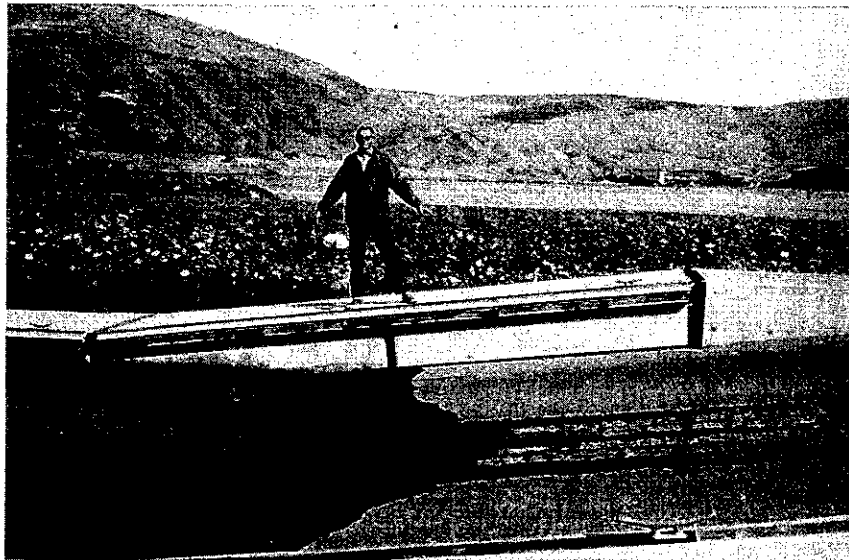
After carefully studying and evaluating designs of various floating structures, the following one was selected and is recommended for installation at 17 spots on the Lower Snake River Project. The structure, which measures 20 feet long by six feet wide, is one section of a hinged concrete dock or Unifloat used extensively by the Corps of Engineers made by Builders Concrete, Inc., "C" and Maple Streets, Bellingham, WA 98225. When placed in water the Unifloat has about 14 inches of free board. A "lip" or edge about two to three inches high should be added to the upper rim of the Unifloat so that sand and gravel placed on it will not wash or blow off easily. A steel anchor chain attached at each end of the structure should be adjusted in length to allow the Unifloat to rise and

fall with changing water levels, but not allow it to drift sideways and touch land or bottom. In addition to placing sand and gravel as a nesting substrate on the Unifloat, a small log and several pieces of driftwood should be placed near the upwind end of the Unifloat to help protect the nest from wind and water. A hinged ramp about four feet wide should be attached to one side of the structure allowing the free end of the ramp to float in the water and thus provide a walkway for young and adult geese. Vegetation may be placed on several Unifloats and not placed on others in order to see which is best.

The concrete Unifloat appears to have several advantages over the small wooden structure described and used successfully by Will and Crawford (1970) in Larimer County, Colorado. Their structure is made of wood, is relatively small, and requires removal from the water before winter for drying and storing to increase its life and prevent damage from ice action. Also, the small and light structure might lack stability for safe nesting in water areas of the size occurring in the Lower Snake River Project. The size and weight of the concrete Unifloats would assure stability even under high wave action, would be a permanent installation, and would require very little maintenance. Vulnerability to vandalism would be low because of construction. Conflicts with boaters, water skiers and fishermen could be reduced by the out of the way location, signing, and by the use of buoys at the head of the embayments.

Where space permits, a floating wooden structure such as the one referred to on the previous page should be installed near the concrete Unifloat for comparative testing on preference and use by geese. Several platform nest designs could also be evaluated in proximity to brooding areas on land. Comparative evaluations should carefully weigh and consider such things as life of the structure; silt deposition; time required for maintenance; nest damage by wind, water, and predators; and average cost per gosling produced over a projected period of up to 50 or more years.

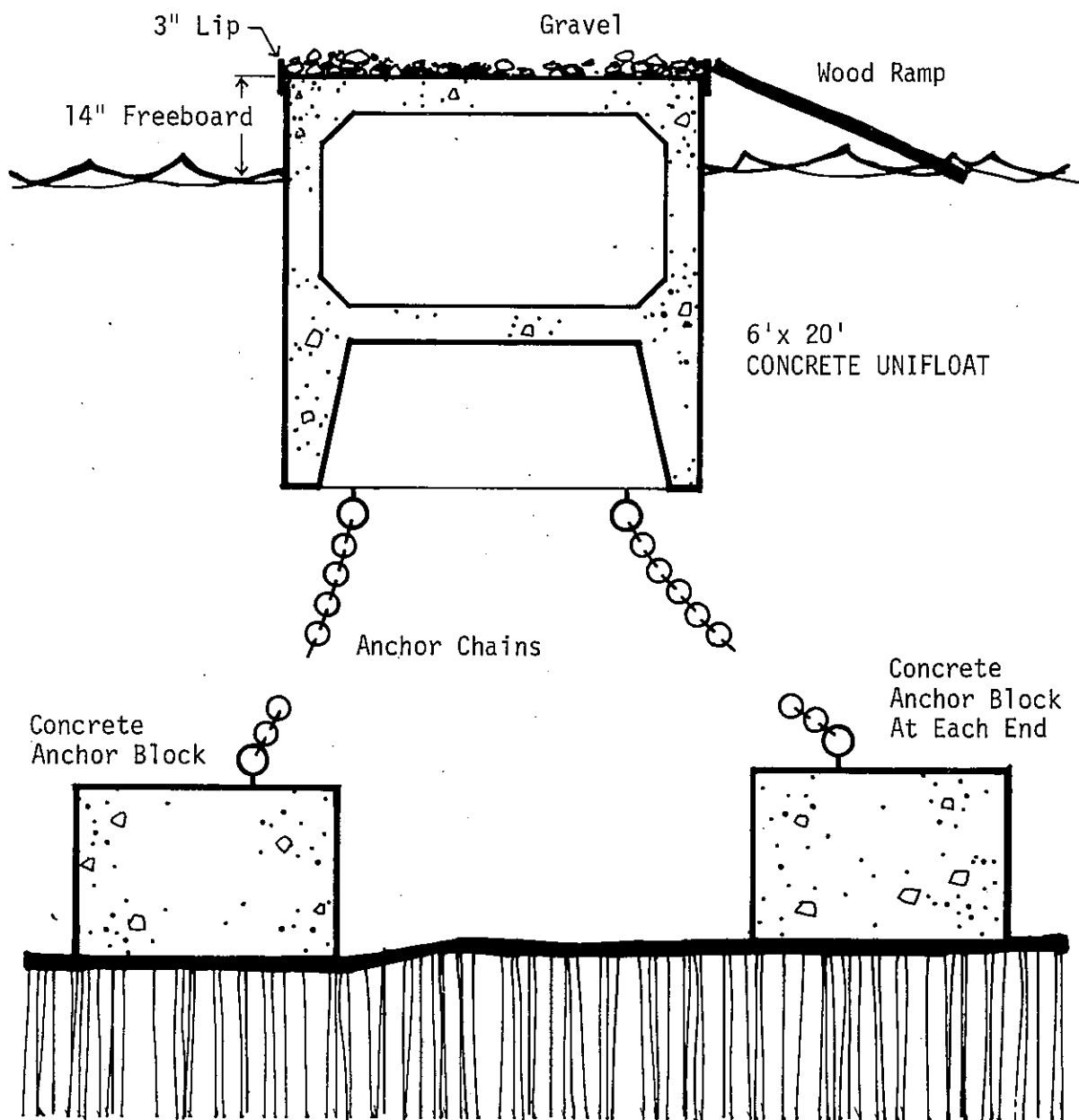
Initially, five Unifloat structures will be installed and tested for a two-year nesting period prior to proceeding with the installation of the other twelve units. Should the proposed floating goose nest structures not be proven satisfactory, alternative measures would be considered.



Concrete Unifloat recommended for installation as a floating goose nesting structure.

FLOATING CONCRETE GOOSE NESTING STRUCTURE

End Section



Stocking Game Birds Compared to a Habitat Nursery. During the preparation of this report, considerable discussion was directed at the subject of raising and stocking of game farm pheasants as compared to developing a propagation nursery for habitat vegetation planting. Diverse opinions have been expressed concerning the relative merits of the use of game farm birds. Dr. Irvin O. Buss, professor of wildlife at Washington State University, has expressed a strong view in opposition to game bird stocking and a concurrent strong view in favor of a vegetation nursery. This point of view contends that the stocking of game farm birds is economically and biologically unsound. The opinion is based on past figures which show a high cost of producing birds, and on research information which indicate a difficulty for game farm birds to adjust and survive when placed in the wild. The annual stocking of birds for hunters to shoot is directed at satisfying immediate desires of the hunters, rather than letting hunters wait for the gradual upgrading of the habitat which then will in turn produce an increase in wild birds.

According to the Washington Department of Game, the program of stocking game farm birds is not considered to be competitive in purpose with the concept of a vegetation nursery for habitat improvement. The following excerpts are taken from a letter furnished by the game department in response to a request for review of a draft of this report:

Like fish hatcheries, game farms are designed to replace consumptive wildlife recreation in areas where seasonal habitat limitations will not allow an equal,

harvestable supply of fish or wildlife to be produced naturally. The techniques for using artificially-reared fish and pheasants have improved dramatically in recent years. Consequently, costs associated with these programs in the 1950's are not typical of cost of producing birds today. In 1972, the cost per game farm-reared bird in the bag was \$5.17 in Washington.

The purpose of game farm pheasants is to restore interim wildlife recreation losses that habitat replacement programs can not immediately fulfill. The purpose of developing a nursery is to provide replacement plant stock for habitat areas. There is no conflict of purpose between these programs.

The intent of this report is not to settle the issue of the relative merits of game farm bird stocking, but it is to concentrate on the aspects of habitat improvement on the Lower Snake River Project lands. It is apparent that habitat improvement is a valuable objective, with or without game bird stocking. A vegetation nursery will be an important part of the maintenance and management of the proposed habitat areas.

Establishment of the nursery is consistent with the view of the importance of riparian habitat to wildlife and the emphasis directed to its restoration, particularly for propagating and growing native shrubs and trees. Successful establishment of native shrubs on project lands would be greatly facilitated by use of a nursery, which would reduce total time for restoration of riparian habitat, reduce total costs of habitat management, and help assure interspersed cover and food through selection and planting of particular plant species.

A research contract has been issued by Walla Walla District to the Department of Forestry and Range Management, Washington State University, to provide information on techniques of seed treatment, planting, and

propagation of various native and naturalized species. Species which can be successfully propagated would be used to supplement the planting shown in the proposed habitat development schemes and also to aid in landscape scar restoration throughout the Lower Snake River canyon. A listing of species being investigated in propagation testing is as follows:

<u>Common Name</u>	<u>Botanical Name</u>
Prostrate Kochia	Kochia prostrata
Sunflower	Helianthus annus
Black thorn	Prunus spinosa
Arrowleaf balsam root	Balsamorhiza sagittata
Sumac	Rhus glabra
Blue lupine	Lupinus sericeus
Rabbit brush	Chrysothamnus nauseosus
Hackberry	Celtis douglasii
Wild rose	Rosa woodsii
Phlox	Phlox longifolia
Rattlesnake brome	Bromus brizaformis
Russian olive	Elaeagnus angustifolia
Bluebunch wheatgrass	Agropyron spicatum
Crested wheatgrass	Agropyron cristatum
Idaho fescue	Festuca idahoensis
Bitter brush	Purshia tridentata
Mountain ash	Sorbus sitchensis
Service berry	Amelanchier alnifolia
Blackberry	Rubus laciniatus, R. ursinus
Drop seed	Sporobalus cryptandrus
Caragana	Caragana arborescens
Red-osier dogwood	Cornus stolonifera
Matrimony vine	Lycum halimifolium
Bladder senna	Colutea arborescens
Nanking cherry	Prunus tomentosa
Blueleaf honeysuckle	Lonicera korolkowii
Vine clematis	Clematis ligusticifolia
Snowberry	Symphoricarpos albus
Canyon heather	Eriogonum nivem
Colden currant	Ribes aurem

The propagation study contract work is scheduled for completion in mid-1976, and the results will then be available for field application in the vegetation nursery.

The major advantage of establishing a nursery is that a permanent habitat can be maintained and a resultant permanent wildlife population may be realized. Other advantages of a nursery would include availability of planting stock from an environment similar to the translocation site, availability for planting at the optimal time, planting of various species of optimal size or age, and availability of sufficient numbers of particular plants at planting time. Furthermore, plantings would be available for erosion control on certain steep slopes where erosion may occur and for areas of construction where vegetation is removed. Near recreation areas and at other locations, certain native plants would be available for aesthetic purposes.

It is proposed to establish the nursery on Lower Granite project near Asotin, Washington. This area would be close to the field management office at Clarkston and convenient to operating personnel. The proximity for day-to-day nursery management is considered to be more important than a central location, therefore the Asotin spot was selected instead of an alternative site at Willow Island on Little Goose project. The Asotin nursery location is shown on Plate 5. The nursery would involve propagation facilities, irrigation system, fencing, land with good soil for lining-out of seedlings, and a transplant holding area.

D. HABITAT DEVELOPMENT PROGRAM

The proposed habitat development program is shown on the maps following page G-85. Planting areas are shown diagrammatically due to the map scale limitations. Each of the sites is described in this section of the report. For each site a brief description is given, followed by a discussion of the management proposals.

WILDLIFE HABITAT 1-S (INTERIM USE)

This area of approximately 275 acres is located 2 miles upstream from Ice Harbor Dam, on the south side of the reservoir, and extends eastward from Charbonneau Recreation Area for about a mile. The level to rolling land has soil that is generally deep, sandy, and alluvial. There is a half-acre pond near the center of this area.

Vegetation tends to be moderate in density. In a few parts of the area vegetation is dense, and in still others plant life is short and sparse. Cheatgrass and bluebunch wheatgrass dominate generally. The remaining vegetation consists mostly of rabbitbrush, Jim Hill mustard, goldenrod, sunflower, phlox, and cactus. Black locust and willow grow near the western end of the area, and willow and alder occur intermittently eastward along the shoreline.

At present large numbers of Canada geese use this area during winter as a feeding and resting area. Ducks (mostly mallards) and shorebirds use the bay (now used for boat landing) for resting and occasional feeding since much of the bay is protected from the prevailing southwesterly winds. Both geese and mallards feed heavily on grass that is clipped and watered on the adjoining recreation area. Small mammals, mostly white-footed deermice, and several species of ground-nesting song birds also inhabit the area.

Considerable development, such as parking sites, walks, small buildings, and a boat ramp, has been completed on the recreation area. A camping area is planned for construction on a strip of land

between the developed part of the recreation area and the proposed wildlife habitat. The area is separated from the surrounding land by a railroad track which skirts the southern boundary of the project. There is a public crossing of the railroad track. About a quarter mile south of the area a housing development is under construction.

MANAGEMENT, WILDLIFE HABITAT 1-S, CHARBONNEAU (INTERIM USE)

Management aim: To provide food for resident (breeding) and migrant (wintering) Canada geese and ducks. Upland bird habitat improvement is also to be provided.

Discussion: Available waterfowl and upland game bird food in the vicinity of this area is very meager and probably limits the number of these important game birds presently occurring there during any season. Large numbers of geese now use the area during winter for feeding and resting. The geese feed primarily on short green grass maintained on the adjoining recreation area or on the wheat lands beyond the canyon rim. Large accumulations of goose droppings on the recreation area attest to heavy winter use. Development of food patches on the adjoining wildlife area will improve quantity and quality of food, thereby increasing survival potential of wintering upland game and waterfowl. Mortalities presently associated with extended movements of waterfowl flying to other feeding sites will very probably be reduced.

Deep alluvial soil in the area should be advantageous for

planting and irrigating. Also, enough tillable land is available to allow for practical development of both cover areas and food patches.

Management recommendations: 1) Establish an irregular food and cover area about 3800 feet long and 400 feet wide along the northwestern shoreline toward the upstream end of the flat. This area should follow management scheme two. 2) Using scheme three, the second area, about 1000 feet by 400 feet, should begin 150 feet east of the inland pond and continue in an easterly direction following the existing gentle ravine. 3) Cattails, sedges, and reeds with a willow border should be encouraged around the edge of the pond. Along the ridge south of the pond, scheme four would be implemented for border purposes between the habitat and recreation facilities. A hedge row along the project boundary fence may be established following scheme 5. 4) The electricity for the habitat irrigation pump can be supplied from nearby lines.

Protection of the pond would be an important aspect of the management program.

It is noted that the habitat development proposed at Charbonneau is planned as an interim use. This site is part of the recreation area even though that portion is yet undeveloped. Development and expansion of public camping facilities may be done on part of the site in the future, as the land is designated for park use in the Ice Harbor master plan. The habitat planting would be done in such a way to provide beneficial plantings for wildlife as well as provide tree growth in locations where future camping may occur. Such development will aid wildlife and also foster the potential for a campground. Even with a future camping area, wildlife values will remain at the Charbonneau habitat area.

WILDLIFE HABITAT 2-N (INTERIM USE)

This area, known locally as Levey Landing, is located on the north side of the reservoir, at approximately mile 13. The wildlife habitat includes two bays and extends east from the developed parkland for nearly a half mile.

Vegetation of the wildlife habitat tends to be moderately dense on the deep sandy alluvial soil. Herbaceous vegetation is dominated by cheatgrass, rabbitbrush, and Jim Hill mustard. Blue-bunch wheatgrass is scattered randomly over the area. The eastern bay, which is bisected by a road, has willow and red-osier dogwood growing at its edges north of the road. South of the road the bay is edged with cattails. The other bay, with a nearby road, supports a good stand of cattails.

Canada geese and ducks rest in both bays and feed on the grass of the park land and at the edges of the bays. A rather wide variety of song birds inhabit the shrubby areas around the two bays. The territories of some of these species are complemented by the grassland and trees of the nearby park. Small mammals (mostly mice) and several species of song birds also inhabit this area.

A railroad bounds the north edge of the area, and a one-way unimproved road extends through it. There are two pipeline easements immediately west of the habitat area. Beyond project boundary the slopes are steep.

MANAGEMENT, WILDLIFE HABITAT 2-N, LEVEY LANDING (INTERIM USE)

Management aim: Improve habitat conditions for upland game and nongame animals, and improve nesting opportunity for Canada geese.

Discussion: Wildlife management at this site should improve the user value of Levey Landing Park. Development of riparian habitat would increase the attractiveness and use of the park. On the other hand, park activities would not conflict significantly with the increase in animal populations provided that off-road vehicle use is controlled.

The habitat development at this site would be considered an interim use since the land is classified for public recreation with park use; however, the habitat will become a natural study area within the park rather than displaced with facilities for picnicking or camping. Perhaps in the long-term future a portion of the habitat area may be used for other recreation functions, but the foreseeable use is for the natural area.

At the present time there is lack of good nesting sites for geese in this vicinity. Therefore, it is proposed to install two floating structures for geese in the easternmost bay at a point farthest from the park development. Public vehicular traffic would be kept out of the habitat area so that disturbance would be kept to a minimum.

Management recommendations: 1) An irrigation system would be installed on the two easterly ridges following scheme four. The pipe should be laid three-quarters of the way up the northeastern side of both ridges. This method will help reduce evaporation from the hot afternoon sun. 2) A scheme 5 hedgerow would be maintained along the project boundary (railroad right-of-way) fence. Local electricity

can be used and the pump would have automatic timer switches.

Install two 6 X 20 foot concrete Unifloats in the east bay.

WILDLIFE HABITAT 3-N

Big Flat, extending upstream from mile 15, is the largest (772 acres) wildlife habitat on the project, with a central length of about a mile and twice this length at its northern edge. Dalton Lake at the north edge of Big Flat is nearly three-fourths of a mile long with a causeway and culvert near its outlet to the reservoir. There is a large bay at the southeast side of the area. The sandy soil is alluvial, shallow to deep, and mostly gently sloping.

Vegetation of Big Flat generally has moderate density and is dominated by wheatgrass and rabbitbrush. Dalton Lake and the bay outside the causeway are edged with cattails. At the western edge of the bay are black locust and willow trees. The bay at the southeast side of the area has an edge of alder, willow, and cattail bordered by a profusion of tall herbs growing on low subirrigated land.

This is a very important resting area for Canada geese and ducks that use Dalton Lake and the southeast bay, both of which are well protected from wind. Wheat fields above the canyon slopes adjoining Big Flat provide a ready source of food. During winter periods when snow covers the uplands, cheatgrass on Big Flat is available and used as an emergency food by both geese and mallards. Coots, rails, and shorebirds occur seasonally, and a variety of song birds inhabit the

area, particularly the tall and dense edge vegetation of the lake and two bays. Raccoon, mink, and muskrat occur both as visitors and inhabitants of the area.

A large draw extending up slope from near the western end of the area supports pheasants and a few partridges, and the entire slope beyond project boundary supports chukar partridges and deer.

Dalton Lake and the southeast bay provide excellent sites for locating artificial goose nesting structures. An unimproved road provides access to the area, and a railroad borders its northern edge.

MANAGEMENT, WILDLIFE HABITAT 3-N, BIG FLAT

Management aim: To provide waterfowl food and increase nesting opportunities for Canada geese and provide upland game habitat.

Discussion: Large numbers of Canada geese rest on Big Flat during winters, but lesser use is made of the area by geese during summer. Increased nesting opportunities and food, particularly for broods, would very probably bolster both resident and winter populations of geese. Relatively high freedom from human disturbance, good soil depth for crop production, and adequate size for practical development make Big Flat of paramount importance for preservation and production of waterfowl and game bird populations.

Dalton Lake and the southeast bay, being of an ideal size and well protected from winds, are well suited for installation of floating structures for goose nesting. Proximity of these nesting sites to alfalfa fields established on Big Flat would result in optimal conditions for successful goose production.

Management recommendations: 1) Plant an area 2600 by 800 feet toward the northern end of the flat. 2) Directly west of this area a hedgerow as in scheme five, should be planted along the project boundary fence. 3) A second field in the shape of a dog's leg with the approximate dimensions of 5200 by 800 feet running adjacent to the lake on the southeastern portion of the flat should follow scheme two. 4) The cattails, sedges, reeds, willows, alders, black locusts, and any other trees and shrubs should be encouraged around Dalton Lake and the bay near the northeastern corner of the flat. A portable pump will have to be used for the irrigation.

Install a concrete Unifloat measuring six feet wide by 20 feet long in the southeast bay, and a second one about three-fourths of the distance from the causeway to the end of Dalton Lake. Two other floats also would be installed in Dalton Lake, at locations selected in the field.

WILDLIFE HABITAT 4-S

This habitat, with a pond and a bay, is below Fishhook Park on the south side of the reservoir opposite the east end of Big Flat. Total area size is about a half section. Most of the land slopes moderately to steeply. Soil depth is shallow to medium.

Vegetation on this area has low to moderate density, and is dominated by cheatgrass and rabbitbrush. Cattail and willow grow densely around the edges of the bay and pond.

The bay has been reported as being an excellent resting area for Canada geese that feed in the wheat fields above the slope. Short green cheatgrass on the area is used as an emergency winter food by geese and mallards during severe winter weather when snow covers the wheat fields above the canyon slopes. Pheasants and chukars use this area in conjunction with the canyon that extends beyond the project boundary.

The bay provides an excellent site for locating a floating goose nesting structure.

Fishhook Park adjoins the area on the east. An unimproved road leads to a gravel pit which is near the center of the area, and a railroad track runs along its western edge.

MANAGEMENT, WILDLIFE HABITAT 4-S, FISHHOOK BAY

Management aim: To improve opportunities for upland game habitat and goose reproduction.

Discussion: Shallow to medium soil depths on moderate to steep

slopes are not conducive to establishing field crops for wildlife food on this habitat. Also, a substantial food source would be available for geese across the reservoir on Big Flat. About 130 acres of wheat and alfalfa are recommended for Big Flat, for the establishment of both winter food and rearing of young geese.

Management recommendations: 1) A timer controlled, solid set irrigation system as proposed in scheme four would be installed on the slope facing northwest. Continuation of the irrigation system along the northern project boundary fence as in scheme five is recommended. A local power line is available for the pump. 2) Willows and cattails should be augmented with additional plantings around the pond and bay, and in the ravines with intermittent water supplies. Two such ravines exist in the habitat area, the one that flows south and the one that flows west. 3) Install a concrete Unifloat six feet wide by 20 feet long near the center of the bay.

The area would be fenced along the project boundary.

WILDLIFE HABITAT 5-N

Known locally as Lost Island, this habitat is located on the north side of the reservoir near mile 24. The area is about a mile long and a quarter mile wide, or about 160 acres. The land rises from water level to a height of 50 feet at the upper edge of the project boundary. Soil is of good depth, sandy, and alluvial. There are two bays and a pond.

Vegetation is judged moderate in density and is dominated by cheatgrass and rabbitbrush with scattered Jim Hill mustard. Alder, willow, cattail, and white clover are found at edges of the pond and bays.

Pheasants occur in the moderately dense and varied vegetation. Chukars also occur here and on the more exposed, rocky slopes above the project boundary. Canada geese and ducks (primarily mallards) utilize the protected and remote pond and bays for resting and to a lesser degree for nesting.

Immediately downstream from this habitat and close to an unimproved road there is an excellent canyon that extends well beyond the project boundary. This canyon and Lost Island wildlife habitat provide a composite range highly valuable for practically all the important wildlife species represented in the canyon of the entire Lower Snake River Project (big game, upland game, waterfowl).

The one access road to this area is not regularly or heavily used. Thus the entire biotic community represented in this area is

one of semi-isolation with minor disturbance.

MANAGEMENT, WILDLIFE HABITAT 5-N, LOST ISLAND

Management aim: Improve habitat conditions for upland game and non-game animals, and improve opportunities for Canada goose reproduction.

Discussion: Relative isolation of Lost Island and the presence of a good site for a goose nesting structure suggest that development of the habitat for use by geese would pay good dividends. The addition of an alfalfa field, a goose rearing pasture, to complement the artificial nesting structure would increase the potential for gosling survival. In addition to benefits provided to geese by the alfalfa field, deer and upland game now living within and beyond project boundary would be attracted to the field, at least seasonally.

Placement of a food patch west of the large bay, would leave a rather extensive area east of the bay for increasing riparian habitat. Shrub plantings should be emphasized for both cover and food for upland game. Such plantings would be attractive to numerous nongame species as well as upland game. Good soil depth plus sub-irrigation around the pond, the two bays, and shoreline suggests that little watering would be required, except at the time of planting and until shrubs have become well established. Failure to provide water initially would result in high mortality to shrubs.

Management recommendations: 1) The first field west of the bay (1320 feet by 400 feet) would follow scheme two. 2) The second field (2600 feet by 400 feet) with a slight dog leg northeast of the bay would follow scheme one. The western and eastern ends of the field each starting from the water, should be treated as if they were separate scheme one plans. The result will provide food patches closer to the water. 3) A portable power unit for the pump must be utilized. 4) North of the second field, scheme five would provide a hedgerow along the project boundary fence. The following shrubs should be planted on the area east of the large bay; black hawthorne, wild rose, chokecherry, snowberry, serviceberry, and red-osier dogwood. After these shrubs become well established, the vine clematis should be planted close to the hawthorne so that a dense tangle of cover is provided for critical winter periods. All shrubs should be planted in clumps along the edges and in the lowest sites of the area. 5) Install a concrete Unifloat, six feet wide by 20 feet long, near the center of the bay. 6) For the purpose of maintaining the existing cattle watering easement, it is recommended that a 25 foot corridor be established to a depth of four feet beyond the water's edge.

WILDLIFE HABITAT 6-S

Hollebeke Road at mile 25 leads to this 260 acre area on the south side of the reservoir. The area is about 1.5 miles long and has a bay which is about 2,000 feet in length and partly protected from the southwest prevailing wind. Most of the land is rolling to level with shallow to deep, sandy, alluvial soil.

Vegetation varies from low to moderate density. Cheatgrass and rabbitbrush are dominants, and Jim Hill mustard is scattered over much of the area. Around the bay there are dense peripheral growths of willow, cattail, and alder. On the slopes beyond the project boundary there is sparse herbaceous vegetation, mostly cheatgrass with a scattering of bluebunch wheatgrass.

At present this habitat is used by Canada geese and ducks for resting and nesting. Wheat fields above the upper edge of the canyon provide available food except during emergency periods of weather when waterfowl movements are restricted, or when snow covers the upland wheat fields. During these periods green cheatgrass is available to geese and field feeding ducks on and near the area.

A railroad track crosses the area near its south edge, and an unimproved road extends on the area near the bay. There are pipeline and waterline easements.

The bay provides a good site for an artificial floating goose nesting structure.

MANAGEMENT, WILDLIFE HABITAT 6-S, HOLLEBEKE LANDING

Management aim: To produce waterfowl food and to increase nesting opportunities for Canada geese.

Discussion: Not many upland game animals use this area at the present time, and only occasionally are these animals sighted beyond the project boundary. Canada geese and mallards use this area extensively during winter for resting. During summer fewer geese rest on the area, and occasionally mallards rest close to the bay.

At least 50 acres of alluvial soil suitable for crop production are available on the area, there is year around presence of waterfowl, and the nearby quarter mile long bay is an excellent site for locating an artificial goose nesting structure. Collectively, these observations suggest that management emphasis should be directed to production of waterfowl with some added upland game habitat.

Management recommendations: 1) Establish one area 1320 feet by 400 feet under scheme three north of the bay's end. 2) A hand carried irrigation system covered under scheme four could be installed on the north facing slope of the northern ridge. 3) The project boundary's fence should have a hedgerow such as under scheme five. 4) A local power line is available for the pump. 5) The cattails, sedges, reeds, willow, alder, and other shrubs around the pond should be supplemented with additional plantings.

Install a concrete Unifloat, six feet wide by 20 feet long, approximately halfway between the mouth and terminal end of the bay.

WILDLIFE HABITAT 7-N

Snake River Junction on the north side of the reservoir marks the site of this habitat which is from 300 to 500 feet wide and extends downstream for approximately a half mile. Utility of this habitat is vastly enhanced by McCoy Canyon which extends northward from the upstream end of the habitat a considerable distance beyond project boundary.

Vegetation on the area is of low density. Black locust and alder are scattered over the area with rabbitbrush and cheatgrass growing farthest inland. In the lower end of McCoy Canyon there is a dense profusion of alder, willow, and cattail. Soils tend to be moderate to shallow in depth, and are mostly alluvial. subirrigation occurs in the lower end of the canyon and at the reservoir edge of the project area.

Canada geese and ducks use the area and the mouth of the canyon as a resting site. The canyon habitat is valuable for California quail, pheasants, and chukars. A wide variety of song birds breed on the area, and an even greater variety are attracted to the area during migration time.

A railroad track and station, a dwelling house, and an unimproved road are on this site.

ENHANCEMENT, WILDLIFE HABITAT 7-N, SNAKE RIVER JUNCTION

Management aim: Provide riparian habitat for upland game and nongame animals.

Discussion: Although Canada geese, and occasionally a few ducks, stop at this site temporarily to rest, greatest use is by upland and nongame animals. Considerable opportunity exists for development of this habitat for the more prevalent animals. Some woody vegetation (trees and shrubs) already occur on the area indicating potential for growth of these species. Areas of rabbitbrush and wheatgrass growing on alluvial soils of good depth offer excellent sites for shrub plantings. Also, sites that are subirrigated provide excellent sites for shrubs less tolerant of soils with low moisture. Food producing shrubs should have precedence, since winter foods are scarce in this vicinity. Both canyons (McCoy and the next canyon to the south) have pheasants, chukars, and lesser numbers of California quail living in them. These animals would spread into the project habitat and increase in numbers proportionate to the degree of habitat production.

Management recommendations: 1) Scheme four with the hand carried timer controlled irrigation system should be installed along the bench below the railroad track. 2) A local power line is available for the pump. 3) The intermittent stream at the south end of the wildlife area could have a windmill installed to supply water to the stream throughout the year. This windmill would be installed on an experimental basis. If successful, the concept could be used at several other places.

WILDLIFE HABITAT 8-S

This habitat is on the south side of the reservoir near the site of Walker and includes two embayments with surrounding lands that extend upstream from mile 30 approximately one mile.

On most of the area vegetation is sparse. Both embayments are surrounded by willow and cattail, and a few alder occur at one edge of the area close to the reservoir. Approximately three-fourths of the sparse vegetation consists of cheatgrass and one-fourth rabbit-brush. There is some clover at the edge of the upstream embayment. On the lower slope above project boundary vegetation tends to be moderate in density, consisting mostly of cheatgrass and bluebunch wheatgrass.

Ducks and Canada geese use the area for resting. During winter, particularly when severe weather restricts movements of waterfowl or when snow covers the wheat lands above the canyon, these birds can graze on grasses on the lower slopes above the project boundary.

A railroad track and an unimproved road extend through the area. A grain elevator and a frame building have been constructed near the railroad track. At least one acre of the area has had the surface soil removed exposing coarse gravel and rocks.

MANAGEMENT, WILDLIFE HABITAT 8-S, WALKER

Management aim: To provide upland game habitat.

Discussion: Frequent human activity including the railroad, improved gravel roads, and the small settlement of nearby Walker creates a large amount of habitat disturbance. Management practices that lean

towards birds and mammals that adapt to human disturbance should fit this environment.

Management recommendations: 1) A hand carried timer controlled irrigation system under scheme four A should be installed on the flat near Walker. 2) The bay north of Walker should have scheme four hand carried irrigation system employed along the ridge facing north and across the drainage up to the project boundary fence. Scheme five should be employed along the project boundary. 3) A nearby power line is available as an electrical supply for the irrigation pump. 4) Live-stock water easements are involved here. Twenty-five foot corridors are recommended for two water sources within the management area. One should extend from the embayment near the north end beyond the north boundary of the area. The other should extend from the series of small ponds in the south central portion of the area northeast to the boundary. The project boundary around the habitat area would be fenced.

WILDLIFE HABITAT 9-N

This area is at Couch Landing near mile 32 on the north side of the reservoir. Nearly all the land is less than 10 feet above the operating pool level. Total land area is approximately 160 acres.

Vegetation density generally is moderate, being dominated by cheatgrass and rabbitbrush, with scattered bluebunch wheatgrass, clover, mustard, cattail, willow, alder, and black locust. The willow and alder grow near the subirrigated edge of the area, and cattail and willow occur farther inland along the edge of a slough.

Waterfowl, pheasants, chukar partridge, song birds, mink and raccoon occur on the area either as permanent residents or seasonal visitors. The slope above project boundary is moderately steep with vegetation of low density. Common plants on the slope are cheatgrass and bluebunch wheatgrass which are used, at least seasonally, by deer.

A railroad track and an unimproved road have been constructed near the north edge of the area.

MANAGEMENT, WILDLIFE HABITAT 9-N, COUCH LANDING

Management aim: Provide riparian habitat for upland game and nongame animals.

Discussion: Waterfowl stop occasionally to rest, and possibly

find some food, but the greatest use of this area is by upland game and nongame animals. Open areas, which are requisite for good waterfowl habitat, are few and too small on Couch Landing.

Considerable opportunity is present on the area for production of habitat for upland game animals. Occurrences of rabbitbrush, cattail, willow, alder, and black locust provide good evidence of growth potential for these species. The open areas dominated by cheatgrass and rabbitbrush growing on alluvial soils of good depth are good sites for shrub and tree plantings. Also, the subirrigated land around the inland slough and along the edges of the area offer excellent sites for moisture loving shrubs such as willow and red-osier dogwood. Plants that produce food, particularly persisting fruits, should be given high priority for planting since food appears to be limited on this area especially winter food within cruising distance of upland game animals.

Management recommendations: 1) A hand carried, portable timer controlled irrigation system under scheme four A should be utilized. 2) The livestock watering easements should be renegotiated for locations on the far eastern and western ends of the wildlife management area.